when used in this manner, because the scum and mud liberated within the.boiler may cause foaming, or priming, so that the superheater may be completely choked up. If the steam is not superheated, the foam is carried over to the engine or turbine, and may cause very bad water-hammer in the engine cylinders, and even blow the cylinder covers oil" altogether. With turbines, the Wading may strip.

The author has, during the last twenty years, made a very special study of feed-water treatment. During this period many boiler compositions have been tried and discarded as being, in many cases, worse than useless where high-pressure steam is generated. It lias been found that the old method of water softening by means of freshly burnt lime and carbonate of soda is the real scientific method. This method can be controlled with the utmost precision, by analysing the water frequently if it varies rapidly in composition, as it does when taken from an ordinary inland river. The analysis should be carried out about three or four times per day of twenty-four hours, and the analysis need give no more than the amount of total hardness in the water, and the amount of temporary hardness. Having determined these quantities, an alteration is made to the filler plant, as required, so as to increase or decrease, separately or together, the amount of lime or soda introduced per thousand gallons of water treated. In this way (i) no more of either of these two chemicals is put into the water than is absolutely necessary, (2) the bulk of the deposit is left in the filter plant instead of in the boiler, and (3) the water is neiitralixed so that it is nearly soft, but not quite, the outstanding hardness being compensated i'or by the small amount of soda thai[1] is put into the boiler in excess. It has been proved that boilers can be left on load for twelve months at a time without

(1)requiring to have the turbine tube cleaner put through the tubes at all,

(2)without losing any boiler tubes from the formation of scale, or internal corrosion, and (3) without having trouble with the brass mountings of the boiler, such as the water gauges, &c. The boilers,

during the whole of their normal working period, can be kept at: their normal full-load rate of evaporation. The essential points of the method are (i) frequent examination of the water, and (2) alteration of the amount of chemicals added to the water as and when required.

The chemical methods by which the necessary analyses may be readily made are described in detail in this volume (KNGINRERINO CIIKMISTKY).

Valves and Boiler Mountings. -The question of keeping the valves and boiler mountings tight is one that requires considerable thought and attention, and the first policy to adopt, where low maintenance costs are especially desired, is to use the highest class of fitting only. There are, unfortunately, many steam valves on the market which are made of material that has not been treated on recognized scientific lines either as regards the nature of the material used for constituent parts or the heat treatment it receives. Failure in either of these directions is fatal in high-pressure work. It has, in fact, proved necessary where highly superheated steam is used, to use alloys that contain no yellow metal whatever. These alloys contain